Name of the project	Ammonia emission reduction in Mediterranean agriculture with innovative slurry fertigation techniques.	LIFE16 ENV/ES/000400 ARIMEDA	
Website	https://www.lifearimeda.eu	E-mail	lifearimeda@cita-aragon.es
Project Leader	Centro de Investigación y Tecnología Agroalimentaria de Aragón- CITA, Spain		
Starting year	2017	**Closing year**	2021
Budget	2,608,324 €	**Programme**	LIFE: Environment and Resource Efficiency
Main objective	The goal of the LIFE-ARIMEDA project is to demonstrate reductions in ammonia emissions through fertigation techniques using raw and digested pig slurry in extensive crops.		
Project Partners	Acquafert S.R.L., Italy Asociación de Defensa Sanitaria Nº 2 Comarcal Porcino, Spain Agriter Servizi Srl, Italy Associazione Regionale Allevatori della Lombardia, Italy Riegos Iberia Regaber, S.A, Spain Mecàniques Segalés, S.L., Spain Università degli Studi di Milano, Italy		

Project Description	The LIFE ARIMEDA project has demostraste the reduction of ammonia emissions when using fertigation techniques with slurries and digestates liquid fractions in drip and low pressure pivot irrigation systems in maize cropping systems. Ten **productive demonstrative fields, four in Aragon** (Spain) and three in Lombardy (Italy) cropped with maize (for grain in Spain and for fodder in Italy), where implemented and monitored during three consecutive years. The environmental and agronomic benefits of fertigation relative to traditional fertilizing practices was assessed qualitatively and quantitatively on the basis of sound and scientifically proven methodologies. Ammonia emission were calculated using WindTrax free simulation software (Thunder Beach Scientific). Air ammonia concentrations were monitored in the fields with ALPHA® samplers that were exposed by triplicate in different points over the fields for at least ten days after every fertilizing event and sampled at intervals between 24 hours and 3 days. The application of digestate and pig slurry liquid fractions through fertigation significantly reduced ammonia emission in comparison to reference practices. The application of 50% of crop nitrogen needs with digestate before sowing with direct incorporation to the soil and the remaining 50% in fertigation reduced ammonia emissions in more than 60% when using pivot irrigation systems and 90% with subsurface drip irrigation. In the case of pig slurry all crops N need were covered using fertigation. Ammonia emission was reduced in the average by 76% in pivot irrigation systems and almost a total reduction of ammonia emissions was reached (90% reduction) with subsurface drip irrigation. The splitting of digestate and pig slurry liquid fractions with irrigation allowed a reduction in the amount of N applied that also affected positively the reduction of ammonia emissions. The control of nitrate concentration below the root zone periodically during the crop cycle showed that the risk for nitrate leaching was not higher in fertigated fields than in reference fields. In pivot fertigated fields nitrate concentrations were systematically lower than in reference fields, mainly driven by the lower amounts of N applied. In subsurface drip fields nitrate concentration maintained the same level than in reference fields. Yield (grain and fodder) and crop N uptake presented a high variability depending on the year but were similar in digestate and pig slurry fertigated fields than in reference fields. The survey undertaken among farmers in Aragón and Lombardia evidence that they recognize fertigation as an opportunity for improvement of livestock manure management in their regions. The economic advantages of the mixed livestock-agricultural is perceived as the main incentive for the implementation of fertigation techniques, including the ease of handling and distribution of the products, and the replacement of synthetic fertilizers by organic products recycling the available resources within the productive chain. Main barriers are in the investments that are necessary

for solid/liquid separators and injection systems, the operation and maintenance costs of the systems and the needs of technical personnel for proper execution of fertigation. It was repeatedly insisted that the lack of a clear regulation in the use of these practices, the restrictions on the use of organic fertilizers that prevent taking advantage of all the benefits of this technique and the absence of regulatory measures that favour and promote the use of organic fertilizers versus synthetic ones are the main bottle necks for the introduction of this technique.

The analysis of the potential for transfer of these innovative techniques to other Mediterranean areas was conducted using a result-based approach and based on the benefits and limitations identified throughout the project. The technique was transferred into five other agricultural sites during the project, two in Aragón and two in Lombardia.

Two key supporting tools of the LIFE ARIMEDA project are freely available in the project website (www.lifearimeda.eu) to catalyse the dissemination of the lessons learnt in the project:

Guide of good fertigation practices that gather key issues and know how acquired in the implementation of fertigation techniques.

ARIMEDA app that supports and guide the user in the design and appropriate fertigation strategy in their fields.


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